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JC918 U.S. PTO

Case Docket No. 60,469-021

Date: August 25, 2000

BOX PATENT APPLICATION
Assistant Commissioner for Patents
Washington, D. C. 20231

Sir:

Transmitted herewith for filing is a Patent Application of:

Inventor(s): John P. Wesson and Neil R. Baldwin

For: ELEVATOR ROLLER GUIDE AND RAIL ASSEMBLY

Enclosed are:

☒ 11 Page patent application.
☒ 2 Sheets of drawings -- Formal, ☒ Informal
☒ An Assignment of the invention to
☒ A Combined Declaration and Power of Attorney
 A Verified Statement By Assignee Claiming Small Entity Status
 An Associate Power of Attorney
 A Preliminary Amendment
 Information Disclosure Statement and PTO Form 1449 with copies of cited patents

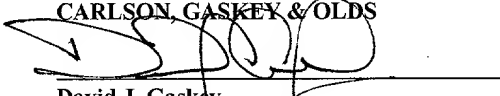
The filing fee has been calculated as shown below:

	No. Filed	No. Extra	Small Entity		Large Entity	
Basic Fee					\$	690.00
Total Claims	12-20	-0-	@ \$ 9	-0-	@ \$ 18.00	-0-
Indep. Claims	2-3	-0-	@ 39	-0-	@ \$ 78.00	-0-
Multiple Depend. Claim(s) Present <u>-0-</u> \$ 260.00						
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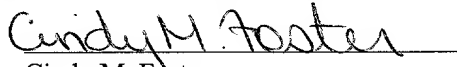
Respectfully Submitted,

CARLSON GASKEY & OLDS


David J. Gaskey
Registration No. 37,139
400 West Maple Road, Suite 350
Birmingham, MI 48009
(248) 988-8360

CERTIFICATE OF MAILING BY EXPRESS MAIL

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Cindy M. Foster

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ELEVATOR ROLLER GUIDE AND RAIL ASSEMBLY

BACKGROUND OF THE INVENTION

5 This invention generally relates to elevator door systems. More particularly, this invention relates to an assembly with a unique roller guide for guiding rollers along a rail for moving an elevator door.

 Typical elevator door systems include a door frame supported by rollers that roll along a rail so that the door can be moved between opened and closed positions.

10 The rollers typically are driven along the rail using mechanical links, cables, linear motors or other assemblies. In most instances, the rail is made of a metal material while the rollers include a metal or plastic wheel with a flexible material around the circumference of the wheel that rides along the rail. The flexible material is provided on the roller to dampen or reduce noise and vibration during door movement.

15 Another purpose for providing a flexible material around the circumference of the roller is to provide traction control.

 One difficulty associated with conventional roller and rail assemblies is that the rail surface is subject to wear and corrosion. Typical rails are made from steel or aluminum and require a surface treatment to resist wear and corrosion. Although

20 various attempts have been made to coat rails, no surface protection method to date has proven completely satisfactory, in part, because of the unavoidable presence of abrasive debris in an elevator hoistway. Coatings are also undesireably expensive.

 The challenge of designing a roller and rail system has become further complicated by the introduction of powered rollers for moving elevator doors. In

these instances, the roller and rail interaction must not only support the door but also provide sufficient traction for moving the door. Competing design considerations come into play because the roller must maintain a reasonable contact footprint while, at the same time, having a small enough diameter to fit within the available space design constraints of a typical elevator system.

This invention addresses the needs for prolonging the life of the roller and rail system while enhancing available traction and increasing the longevity of the elevator door assembly. This invention avoids the shortcomings and drawbacks described above.

SUMMARY OF THE INVENTION

In general terms, this invention is an assembly for use in an elevator door system that includes a rail and at least one roller that is adapted to move along the rail. The rail includes at least one supporting surface along one side. A resilient track is at least partially received by the supporting surface on the rail. The roller then rolls along the track as the door is moved relative to the rail.

In one example, the track is a flexible insert that is snapped into place on the rail. The track can be removed and replaced over time as may be required.

In another example, the track is a sprayed on material that forms a resilient surface on the supporting surface of the rail.

In another example, the track is a flexible insert that includes several different pieces. Each of the pieces can be made from a different material, for example, to achieve different friction characteristics at different locations along the length of the

rail. For example, higher friction is desired at the ends of the rail where the rollers accelerate and decelerate as the elevator door is moved from one extreme to another. A central portion of the track can include a smoother surface that provides quieter door operation.

5 The various features and advantages of this invention will become apparent from the following detailed description of the currently preferred embodiments. The drawings that accompany the detailed description can be briefly described as follows.

BRIEF DESCRIPTION OF THE DRAWINGS

10 Figure 1 diagrammatically illustrates an elevator door system incorporating an assembly designed according to this invention.

Figure 2 is a cross-sectional view of a roller and rail.

Figure 3 diagrammatically illustrates a rail and roller assembly including a track designed according to this invention.

Figure 4 illustrates a feature of the embodiment of Figure 3.

15 Figure 5 illustrates an assembly designed according to this invention including a motorized roller drive.

Figure 6 shows an alternative motorized drive design.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

20 An elevator door assembly 20 includes a door frame 22 supported by a conventional support device 24. The door frame 22 is supported to move along a rail 26 through the movement of rollers 28 so that the door can be moved between opened and closed positions, for example.

A resilient track 30 is included on one side of the rail 26. As best seen in Figures 2 and 3, one example of the track 30 is a resilient or flexible insert that is received on one side of the rail 26. In the illustrated example, the track 30 includes a first portion 32 and a second portion 34 at opposite ends of the track 30. A third portion 36 extends along a central portion of the rail 26. In the preferred embodiment, the track 30 extends along the entire length of the rail 26.

The first portion 32 and second portion 34 of the track 30 preferably include a traction surface 38, which can be realized in various forms. In one example, the surface of the track 30 is knurled or provided with a roughened surface for increased traction between the roller 28 and the track 30. The central portion or third portion 36 of the track 30 preferably includes a smooth surface 40 that allows for quiet roller operation as the roller rolls along the track 30. The two ends of the track preferably provide enhanced traction to facilitate better acceleration and deceleration at the ends of movement of the door. Since the velocity of the door is typically constant through a central portion of its motion, the smooth surface 40 preferably is provided along a central portion of the track 30. In practice, the third portion 36 typically is much longer than the end portions 32 and 34.

In one example, the first portion 32, the second portion 34 and the third portion 36 of the track 30 are separate pieces of flexible material. Each of the pieces can be individually and selectively replaced as may be needed over the life of the door assembly. Further, each of the track portions can be made from a different material to achieve different friction characteristics along different portions of the rail.

Although three portions are illustrated and discussed, it is, of course, possible to use fewer or more portions as the needs of a particular situation may require. Separate pieces allow for easier maintenance or repair since only selected portions may be removed without disassembling the entire roller and rail assembly.

5 In the embodiment illustrated in Figures 2 through 4, the track 30 is received onto the rail 26 using a snap-type arrangement. A groove 42 on the rail 26 receives a projection 44 on the track 30 so that the track 30 is snapped in place on the rail. Other connecting arrangements can be used, which may include clips or other fasteners.

10 In another example, the resilient track is applied using a spray coating technique. The track 30, in this example, can be applied and replenished over time as may be needed using a conventional spraying technique for applying a flexible material on a supporting surface of the rail 26.

15 The track 30 preferably is made from a flexible, resilient material. Example materials include polyurethane, polyester elastomers, fluoroelastomers, vulcanized synthetic rubber, other elastomers or other rubber materials. Incorporating a resilient track on the rail provides several advantages compared to prior roller and rail constructions. The track 30 eliminates the need for attempting expensive corrosion and wear resistant measures on the metallic surface of the rail. Moreover, the choice
20 of materials for the rail 26 are expanded and can include softer, more easily extruded materials than was previously possible.

Another advantage to the inventive arrangement is that the roller design is greatly simplified. There is no longer a need to accommodate a flexible material around the exterior of the roller. Moreover, the choice of materials usable for the roller is expanded to include hardenable alloys, stainless steels, chromium, nickel, ceramics, other metals or glasses. Still further, the design of the roller itself is greatly simplified, and can become a simple ring or spool-shaped roller. A more simplified roller configuration allows for more versatility in applying coatings to the roller that will enhance wear resistance and corrosion resistance.

Another advantage to using the inventive system is that a roller drive mechanism can be incorporated into the rollers. For example, in Figures 5 and 6, a motor assembly 50 is supported to move with the roller along the rail 26. In one example, the roller 28 includes a plurality of pole pieces 52 that are made from a magnetic material. The motor assembly 50 includes a magnetic motor arrangement that, when energized in a conventional fashion, causes the roller 28 to rotate and move along the rail 26. A variety of motor configurations can be used, depending on the needs of a particular circumstance. The roller 28 could be, for example, made of a ferrite material to interact with an appropriately designed electric motor assembly 50. Alternative constructions include pancake style motor assemblies with appropriately geared roller rings so that the roller 28 is driven along the rail 26 as desired.

The foregoing description is exemplary rather than limiting in nature. Variations or modifications to the disclosed examples of the inventive arrangement

may become apparent to those skilled in the art. Such changes, however, do not necessarily depart from the scope or spirit of this invention. The scope of legal protection given to this invention can only be determined by studying the following claims.

CLAIMS

1. An elevator door assembly, comprising:

a rail including at least one supporting surface along at least one side of the rail;

5 a resilient track at least partially received by the supporting surface on the rail;

and

at least one roller that is adapted to roll along the track.
2. The assembly of claim 1, wherein the rail has a length and the resilient track
10 extends along the entire length of the rail.
3. The assembly of claim 1, wherein the track includes a plurality of portions
with a first portion at a first end of the track and a second portion at a second
end of the track.
- 15 4. The assembly of claim 3, including a third portion between the first and second
portions and wherein the first and second portions have a first roller supporting
surface and the third portion has a second roller supporting surface that is
different from the first surface.
- 20 5. The assembly of claim 4, wherein the first portion comprises a first material
and the third portion comprises a second material.

6. The assembly of claim 4, wherein the first and second portion roller supporting surfaces include a friction enhancing texture.

5 7. The assembly of claim 1, wherein the rail supporting surface includes a groove and the track includes a portion that is removably received within the groove.

10 8. The assembly of claim 1, wherein the track comprises one of polyurethane, a polyester elastomer, a flouroelastomer, vulcanized rubber or a spray-on material.

15 9. An elevator door assembly, comprising:
a door frame;
a door frame support member;
at least one roller associated with the support member;
a rail including at least one supporting surface along one side of the rail;
a resilient track at least partially received by the supporting surface on the rail,
the roller being able to roll along the track so that the door frame moves
relative to the rail.

20

10. The assembly of claim 9, wherein the track includes a plurality of portions with a first portion at a first end of the track and a second portion at a second end of the track.

5 11. The assembly of claim 10, including a third portion between the first and second portions and wherein the first and second portions have a first roller supporting surface and the third portion has a second roller supporting surface that is different from the first surface.

10 12. The assembly of claim 11, wherein the first portion comprises a first material and the third portion comprises a second material.

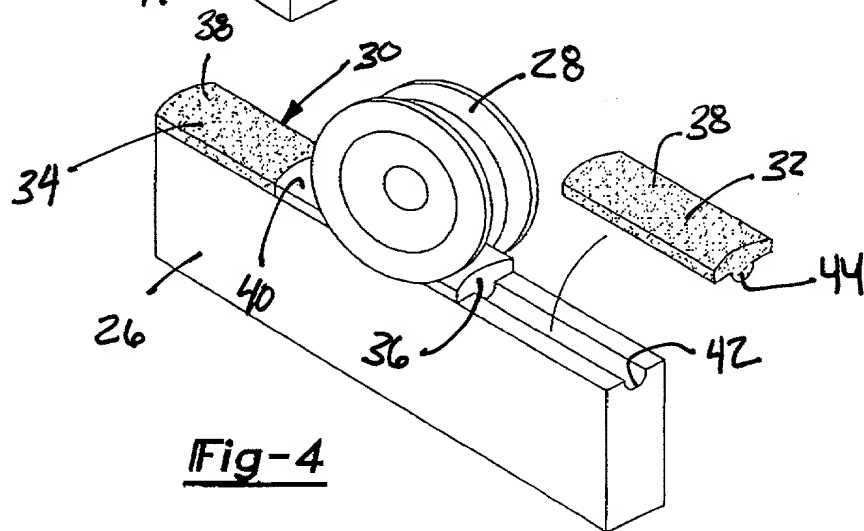
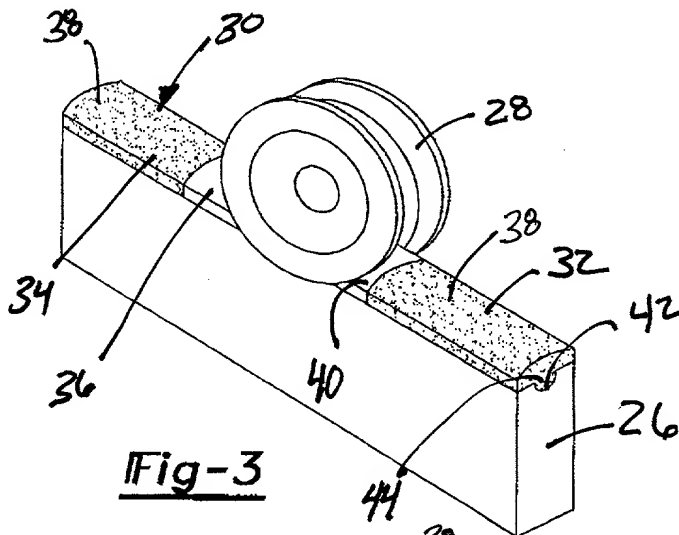
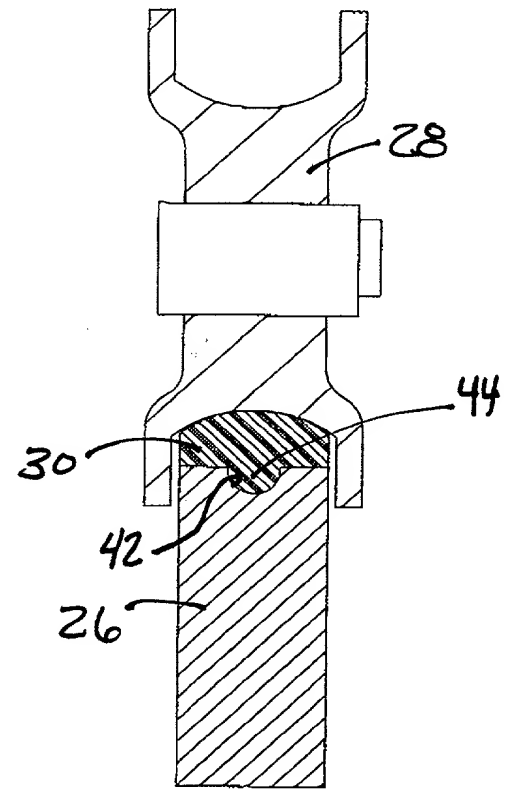
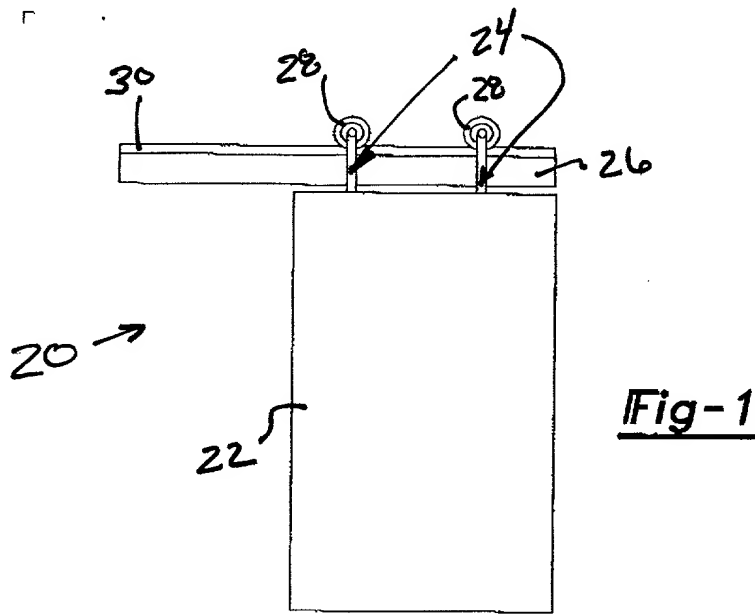
ABSTRACT OF THE DISCLOSURE

An elevator door assembly includes a rail and at least one roller that rolls along the rail to move a door between opened and closed positions, for example. A resilient track is provided on the rail that facilitates more efficient roller movement and increases the longevity of the assembly. In one example, the resilient track includes several pieces of flexible material that are snapped in place onto the rail. In another example, the flexible track is supported on the rail using a spray coating technique.

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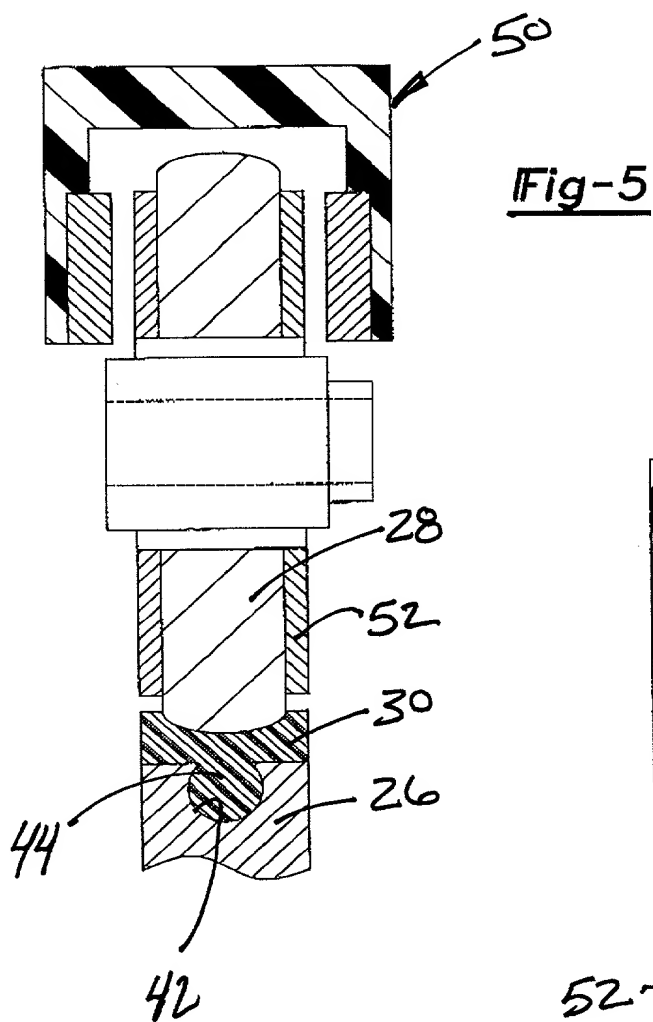
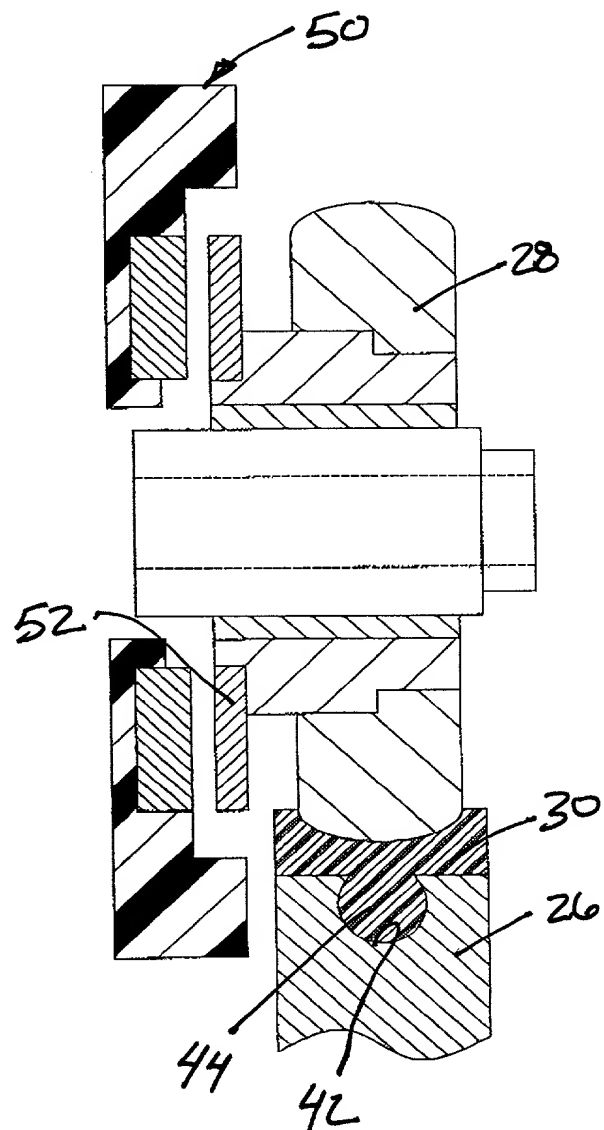


Fig-6



COMBINED DECLARATION AND POWER OF
ATTORNEY IN ORIGINAL APPLICATION

DOCKET NO.
60,469-021

We declare: that our residences and citizenships are as stated below next to our names; that we believe we are the original, first and joint inventors of the subject matter which is claimed and for which a patent is sought in the specification entitled

ELEVATOR ROLLER GUIDE AND RAIL ASSEMBLY

that we have reviewed and understand the contents of the above-identified specification, including the claims; that we acknowledge the duty to disclose to the Patent and Trademark Office all information known to us to be material to patentability as defined in 37 C.F.R. §1.56; that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

We appoint the following attorney(s) and/or agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

Robert P. Hayter (Reg. No. 28,424); Troxell K. Snyder (Reg. No. 30,804); Randy G. Henley (Reg. No. 35,188); John E. Carlson (Reg. No. 37,794); David J. Gaskey (Reg. No. 37,139); Theodore W. Olds (Reg. No. 33,080); Kerrie A. Laba (Reg. No. 42,777); William Gottschalk (Reg. No. 44,130); David L. Wisz (P-46,350)

Direct all correspondence to:

Telephone:

David J. Gaskey

(248) 988-8360

Carlson, Gaskey & Olds
400 W. Maple, Suite 350
Birmingham, MI 48009

FULL NAME OF 1st JOINT INVENTOR

John P. Wesson

INVENTOR'S SIGNATURE

John P. Wesson

DATE

8-15-00

RESIDENCE AND POST OFFICE ADDRESS

39 Donnell Road, Vernon CT 06066

CITIZENSHIP

U.S.

FULL NAME OF 2nd JOINT INVENTOR

Neil R. Baldwin

INVENTOR'S SIGNATURE

Neil R. Baldwin

DATE

8/15/2000

RESIDENCE AND POST OFFICE ADDRESS

574 Gardner St., Manchester, CT 06040

CITIZENSHIP

Canada